SCHOOL LIFE AND ITS RELATION TO THE CHILD'S DEVELOPMENT.[1]

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I suppose it is generally known that a great wave of interest has been passing over this country during the last two or three years. This wave is a movement in favor of so changing the laws of the different States that the early life of human beings should be more protected than it now is under the State laws which govern matters pertaining to child labor. A great deal of discussion has also been carried on regarding the local government of the public schools. The object, in both instances, has been to investigate whether the laws which have existed for many years are the best that can be made, and whether we, in grading our public schools, are really carrying out ideas which from a modern point of view are considered best. There is no doubt, in regard to the former proposition, that the laws governing child labor are not only fundamentally wrong from their lack of wisdom, but that even if they were right, they are so constituted that they cannot be properly enforced.

While carrying on some scientific work in connection with the development of early life, by means of the Röntgen-rays, I arrived at certain conclusions which proved to me that those who are in charge of the welfare of children are ignorant, in many ways, regarding certain facts connected with the physical condition of children. As a corollary to this, it was easy to show that many of the rules made in the past for the good of children, are with our present knowledge manifestly far from beneficial, and, in fact, are founded on ignorance of the latest scientific modern investigations. Ignorance in itself is not a crime, but when we who, as developed adults, are supposed to protect by our knowledge an earlier stage of development which is manifestly unfit to judge for and care for itself, ignorance becomes a crime if we wilfully do not make ourselves cognizant of what science is teaching us. I shall, therefore, try to point out some plain truths, such as, from a medical point of view, have come to my notice in connection with the rearing of young children, the fitting of these children to become good citizens in the future, and their being prepared, both physically and mentally, to judge of and adjudicate the great questions which must come before them in matters of legislation for their country. An educated mind without a sound body is as unfitted to deal vigorously and wisely with the questions of the day, as is a good foot for walking when imprisoned in a tight boot.

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[1] The Sunday Free Lecture, delivered at the Harvard Medical School, Boston, March 14, 1909.

Physical suffering perverts good judgment wherever it appears and whenever it is allowed to continue. It is manifestly the case at present that the young of our country are not protected by certain laws and certain rules, which are supposed to protect them during the formative period of their lives, when proper and wise protection means prevention from possible future and lasting injury to both brain and body. I shall not, here, present the reasons why I am so firmly impressed that the various laws and investigations in connection with child labor have been founded on a wrong basis, although carried on by those who are enthusiastically honest in the reforms which they are endeavoring to make. I shall merely state that the results of my investigations point toward the fundamental principle that a child's physical life should be the first factor in the problem of arranging and moulding this life which we as adults have to solve.

The question, therefore, immediately comes up as to whether there is any known means by which we can readily determine, in a large number of cases and in a limited time, what the child's physical condition as represented by its development really is. We know that we cannot judge of these conditions by height, or by weight, or by the eruption of the teeth. All these sources of evidence which for so many years we have considered to be reliable as indices to aid us in our work have one by one proved to be falacious. The tall, undeveloped child, the heavy child with weak underlying muscles and bones, and the frequent variations as the result of modern life and parentage which occur in the appearance of the teeth, are not manifestations on which we can build up a system for grading children. A much more accurate system is needed to determine when they shall be allowed to undertake certain degrees of manual labor and certain strains in athletic sports, and to give out the mental energy required for the different grades of study during their school life. It is this latter class of cases to which I wish to direct attention.

The guide to the grading of children in school, from time immemorial, has been based in great measure on the number of years since they were born; that is, chronologic age has held a position in, and has exercised an influence over, child life for so many years that it has become one of the traditions of the past, and traditions, as you well know, are difficult to set aside. My investigations with the Röntgen-rays show very conclusively that because a number of children are born in the same year it does not follow that these children, as years go on, have developed equally; on the contrary, after a few years some may be far ahead of the development of the average, and some below that average. We also know that the question of development which indicates strength and the power of resistance to external influences is so closely connected with a child's mental and physical condition that we can no longer, with our present knowledge, keep this element in the background. If twenty boys, or twenty girls, all of whom were ten years old chronologically were pitted ten against ten, whether in football or in basket ball, a very evident discrepancy in strength, resisting power, and in endurance would become at once manifest. This difference in the individual development of these children can easily be made manifest by a Röntgen picture of the underlying framework of their bodies, which represents the basis on which their individual strength should be judged. Quite a number of these twenty children can, in this way, be shown to be perhaps a year or a year and a half in advance of what they would average when judged by their equal chronologic age; some of them would be found to be a year or a year and a half below this standard average of development. In this case, therefore, we should likely have ten of the children whose development is only that of the average chronologic age of eight and a half pitted against ten who had the average of ten and a half years of age. It is through these discrepancies that this subject has been brought to my notice most vividly, when I have seen, as often happens, children with an insufficient anatomical development brought to consult me for anemic and weakened conditions often verging on nervous prostration, which conditions have been evidently produced by the endeavor to keep these children abreast, in both school and athletics, of children of an equal age.

In the rearing of our children, therefore, we should not be influenced entirely by their chronologic age, but should study their individual development, and grade them in divisions of perhaps A, B, C, D. In this way we shall prevent a child, in its daily life, from having its tissues, whether of brain or body, overwhelmed by unnecessarily advanced surroundings.

A possible index by which we can intelligently determine what the surroundings of a special child shall be, can, so far as my studies have carried me, be learned from an investigation of the changes in the development of the joints from birth to adolescence. In one or two seconds, without the slightest danger to the child, a Röntgen picture can be taken of an especial joint.

In the course of my investigations of some hundreds of cases, in which I have studied the joints in normally developed children, it has been shown that it is not necessary, in most cases, to take a picture of all the joints. It has also been shown that in healthy individuals, during the formative period of early life, the bones of the wrist in a very large number of cases are so comparatively uniform in their development in comparision with the other joints, that they can be taken as an index of the development of the special child. It is of great significance that this anatomical index will be of marked value in the determination of the questions connected with child labor if we remember how children, so far as labor is concerned, are graded, mainly on a chronologic basis. The law may say that a child shall not enter a mill until it is twelve years old. The parents wish to have that child, for pecuniary reasons, enter a mill; they therefore swear falsely to the child's age. The child, again, may be tall for its age, and, although it is only eleven years old, may look as if it were twelve. Large numbers of false birth certificates also exist in this country, so that a chronologic law can easily be avoided. This is proved by the number of children who, though manifestly unfitted for the work which is given to them in the mills, are found in the mills and are honestly supposed to be within the requirements of the law, although they not only may not really be of the chronologic age required by the law, but even if they are of that age, may not be in any way fitted to perform the work allotted to them.

This same reason can be applied to the grading of children in the schools. Their age, in most cases, at least, is honestly given, but it is readily seen that if they are graded chronologically, the same conditions, both physically and mentally, which are good and proper for some of these children, are manifestly bad for others. This same reasoning holds good in regard to the question of kindergarten. Much more definite decisions should be made on the time when an individual child should begin with its kindergarten, or should be advanced to the school grades, than is now the case. It is an argument based on false conclusions to say that a bright and precocious child should be advanced in its school grade until it meets with brains which are capable of safely undertaking mental study beyond that met with in the grade of the chronologically younger children, where the bright child is at first classed. These older brains, being more developed, are not harmed by the physical demands which become strains to the bright brain of the younger child. Precocious children should, from this reasoning, not be advanced to a grade in the school which represents a higher type of physical development, but should be employed in mastering the numerous school occupations of the present day which can be acquired out of doors in connection with physical exercises. These bright brains should not be allowed to be advanced to a school grade of higher physical development until their physical development corresponds to their mental power.

This rule of making the development of a child correspond to its mental condition works in both ways. If a child has a bright, in one sense precocious brain, beyond its chronologic age, but at the same time has an anatomical development corresponding to the development of its brain, it can then be advanced into a higher grade chronologically without harm.

There is no doubt that the principle of grading children by divisions of development determined by some anatomical index, which can be obtained by means of the Röntgen rays, will be the grading of the future. We should consider, also, that the question of exactness plays a very important role when we are determining what this developmental index should be. The Röntgen-rays in their picture tell the truth, and by means of this truth we have a powerful weapon with which we can oppose the deliberate falsehoods of parents, guardians, officials, and of those who, for commercial reasons and through excessive greed, wish to obtain labor at the low cost at which it can be bought when children are employed.

Of equal importance with the labor problem, in its direct baneful influence on the child's life, is the unwise and almost criminal desire of parents, guardians, and school teachers, to advance the child in school as fast as its brain, as a piece of machinery for acquiring knowledge, will allow, without considering that any piece of machinery, no matter how good, may be overstrained and rendered unfit for use when its function is pressed beyond what it is intended to carry. Overtaxed physical conditions may result in weakened brain power. A bright brain is not necessarily strong in its functions. Overtaxed mental capacity may result in physical weakness. It is, therefore, only a common sense view of the subject, and one which I hope every one will try to understand and try to carry out in his or her children's lives, namely, to insist that the grading of children in school shall be based upon an equality of physical and cerebral strength. This simply means equality in development. This, again, simply means a determination by means of an anatomical index of what the special development is. This, however, does not mean that a highly developed physical condition, with a corresponding mental condition, should interfere with the line of action which I have just laid down. The dull brains with a highly developed physical condition can be left to take care of themselves. The brain in this case is taking its rest, will not exert itself, and will rarely be harmed. These children can be allowed to fall back in their classes no matter what their physical development is, and educators can place them where they wish.

A great deal of harm comes to children through their parents and guardians supposing that, because their neighbors' children are allowed to take up, according to their chronologic age, certain traditional or modern amusements or studies, according to the community in which they live, their children also are equal to standing the same more or less necessary strain. For some children the continual round of dancing school, music lessons, children's theaters, and other outcomes of civilization involving exaggerated physical and mental activities, are clearly pernicious, unless under very careful supervision, a supervision which should be adapted to the needs and capabilities of the especial child.

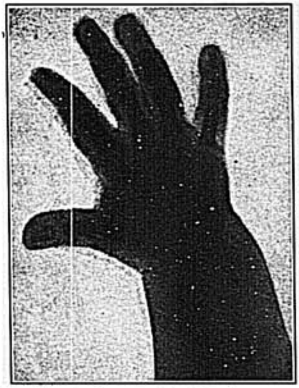

FIG. 1.—The wrist of a girl, aged six months, in which only two small bones are seen to have appeared in the cartilage of the wrist.

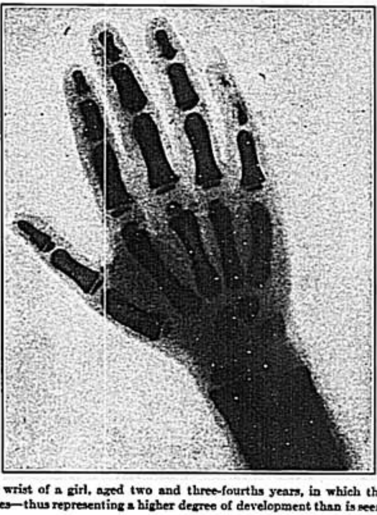

FIG. 2.—The wrist of a girl, aged two and three-fourths years, in which there are three carpal bones—thus representing a higher degree of development than is seen in Fig. 1.

To those who have conscientiously studied children, not merely in their diseases, but as they are seen in their homes, in their nurseries, in their play, and in the many phases of the routine of the various out-of-school occupations, in fact, in all the many means of wear and tear which are brought to bear on the modern child, it is an easy matter rightly to understand the bad results which are so often attributed to the school, and often attributed unfairly. It is the combination of all which is required of children out of school, as well as in school, which brings about the last drop in the bucket. If we could begin all over again, and grade our children on the basis of an equal mental and physical development, half of the disturbances of early life which come under the notice of the physician would cease to be in evidence.

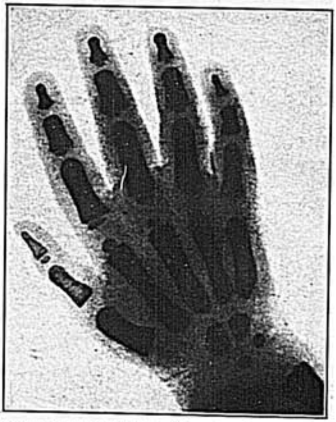

FIG. 3.—The wrist of a girl, also aged two and three-fourths years, showing with its four carpal bones a still higher degree of development than does Fig. 2.

The tendency of what our educators call the most advanced education is to harm the well-being of individuals who must eventually become citizens and govern other human beings. Numerous instances can be quoted as to how misguided are the ideas of certain educators, even though they be prominent as educators. We can hardly believe that a body of so-called educators, meeting together to arrange their schedule for the teaching of children through graded years, should gravely debate among themselves what studies each of them would prefer to teach in such and such a year, rather than at what stage of development, both in mind and in body, it is best for the child to begin such studies; yet this has lately happened.

The parents are often much more at fault than are the teachers. The parents, as a rule, wish to see their children advanced as rapidly as possible, and this phenomenon, which may be called greed of mind, corresponds to what in child labor we have called greed for money. The school teachers over and over again protest against the child's being forced to do work beyond its physical capacity, but rarely can induce the parents to take a more common sense point of view until the child's physician tells them that if this principle is carried out much longer the child may become a cripple for life.

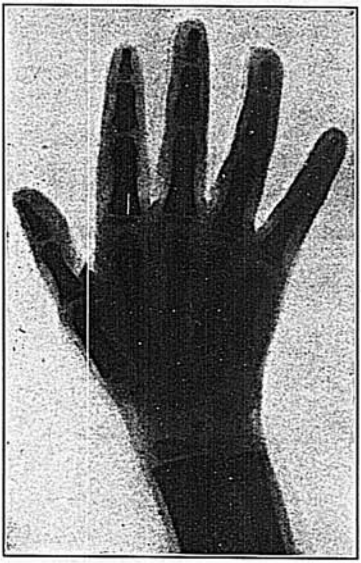

FIG. 4.—The wrist of a girl, aged three and a half years, with an even greater degree of development, as represented by five carpal bones.

It is very evident, from what I have said, that the school life of a child has a very strong and important influence in relation to its development. I ask, therefore, those who are interested in the welfare of children to prevent this unjustifiable grading of children in their school life. Overtaxing the functions of the brain will result in mental fatigue, and this, in its turn, will affect the entire nervous organization of the child and retard its physical development. This lowering of a child's nervous force and interfering with its physical development renders the child more vulnerable to disease. so that in order to reduce the high mortality which occurs in children, we should see to it that by dealing with this developmental idea the child's power of resistance is increased, and, becoming in this way less vulnerable to disease, it will not only have its life preserved where otherwise it might be lost, but in its future life will enjoy a vigorous and healthful existence.

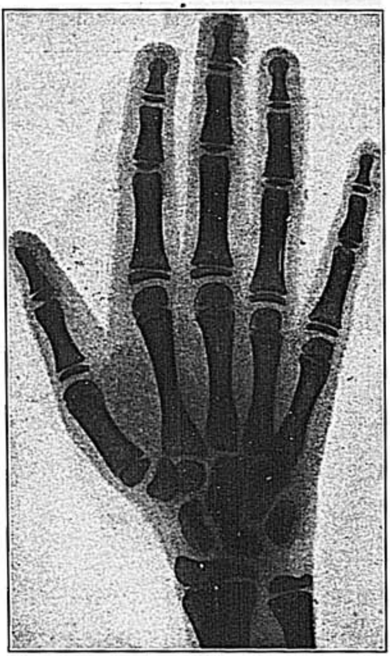

FIG. 5.—The development and massing of the bones of the wrist in a girl, aged eight and one-fourth years.

The remedy for the evils which at present surround the school life of young human beings is that the professed educators, the school teachers, the parents, the guardians, and those physicians who have devoted themselves to the study of early life should act in accord, each giving to the other the especial ideas which have come from the results of their experience and from the study in certain lines in which they have become proficient. As a prerequisite, however, for all changes which will in the future be brought to bear in connection with early life, it should be recognized that chronologic age should be done away with as a basis on which to grade children in schools, in sports, and in the various degrees of work in which they are employed. In fact, chronologic age should be retained only for matters pertaining to the legal profession and in questions of inheritance.

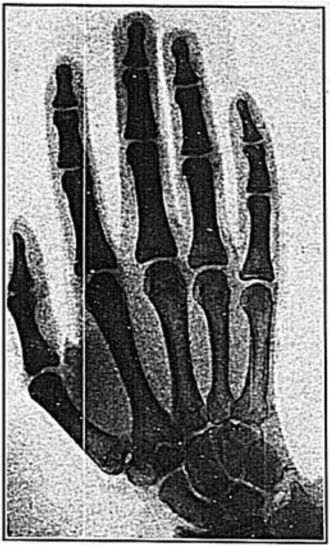

FIG. 6.—The greatly advanced development in number, size, and massing of the bones of the wrist in a boy, aged thirteen and one-half years.

In order that one may understand what I mean by an anatomical index, I append pictures (Figs. 1 to 6), which, in their progression from cartilage to bone, represent different degrees of strength, owing to the greater strength of bone over cartilage. Starting from an almost entire lack of bone in the first year of life, one will notice that these bones increase in number and in size until finally the almost fully developed wrist is attained at about the age of fourteen to fifteen years. This assumes that the quality of the bone tissue is also normal. This also necessitates a qualitative study in the future of bone tissue as well as bone size.

It is thus seen that there is a complete series of stages of development of the wrist from infancy to adolescence, showing in this way different stages of qualitative and quantitative strength, each of which should be equal to the endurance called for by certain kinds of mental fatigue as well as manual labor.

COMPRESSION OF THE PULMONARY VEINS, THE PRESSURE FACTOR IN THE ETIOLOGY OF CARDIAC HYDROTHORAX.[1]

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The hydrothorax that sometimes accompanies heart disease has been recognized for many years. Why it occurs in some cases and not in others is not clear, for it is certain, as both Flint and Da Costa[2] long since remarked, that the phenomenon bears no constant relation to the extent of the cardiac disease. "Not only are these lesions (cardiac) marked in cases in which dropsy has not occurred, but dropsy occurs in other cases in which the lesions are comparatively slight" (Flint[3]).

In seeking an adequate explanation for the occurrence of these effusions we have concerned ourselves chiefly with the effects, the mechanical effects, arising from pressure exerted by the dilated heart. We recognize fully that before an effusion can occur the presence of factors other than pressure may be necessary, for example, toxic, vasomotor, bacterial, or metabolic influences, or a hydremic condition of the blood. Krehl[4] states in this connection: "Certain patients suffering from heart disease in the state of broken compensation show a watery condition of the blood, both the specific gravity and the proportion of proteids in the blood being diminished (Grawitz). A weakness of the right ventricle is especially apt to give rise to such a thing in the blood. . . . This hydremia occurs in a comparatively small proportion of all cases of broken compensation; but where it does occur it is quite usual for it to disappear with any improvement in the circulation."

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[1] Read at a meeting of the Pathological Society of Philadelphia, May 27, 1909.

[2] Medical Diagnosis, eighth edition, p. 422.

[3] Diseases of the Heart, second edition, 1870, p. 37.

Any one of those agents, however, which affect the composition of the blood will fail to account for the fact that these effusions have a marked preference for one or the other side of the chest, usually the right. That pressure alone will cause the transudate is improbable, but it is certainly a factor of the greatest importance. Another point is that the pressure must be from dilatation, as it has long been recognized that hypertrophy of the heart by itself is incapable of producing an effusion, and that dilatation, with or without valvular lesions, is an essential feature.

Recognizing that dilatation of the heart was necessary, most observers contented themselves with the explanation that a transudation resulted from venous stasis, either alone or in association with impoverishment of the blood. In recent years, however, the azygos-vein theory has been much in favor, largely as a result of papers published by Steele[5] and Stengel.[6] Their explanation of these effusions, and particularly of the right-sided preponderance, is that the dilated right heart by extension upward exerts pressure on the root of the right lung and thus indirectly pinches the azygos major vein as it curves over the root of the right lung to enter the superior vena cava. Baccelli,[7] in 1863, first called attention to this possibility, although his explanation differed somewhat from that of Steele and Stengel. His idea was that the enlarged heart, by dragging the superior vena cava downward, carried with it the vena azygos major, thus drawing it tightly around the root of the lung and causing it to be compressed.

What has commended this theory to many is the fact that the vena azygos major receives as tributaries the intercostal veins of the greater portion of the right chest, vessels which drain the major portion of the right costal pleura. The natural assumption has been that with compression of this vein in its upper part there would result a venous stasis on the right side which would lead to a transudation. The theory has gained additional strength from

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[4] Clinical Pathology, American edition, 1905, p. 176.

[5] University Medical Magazine, 1897, Journal of the American Medical Association, October 1, 1904.

[6] University of Pennsylvania Medical Bulletin, 1901.

[7] Quoted by Steele, Jour. Amer. Med. Assoc., October 1, 1904.